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PROVISIONAL APPLICATION FOR PATENT COVER SHEET (Large Entity)

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

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<input type="checkbox"/> Additional inventors are being named on page 2 attached hereto					
TITLE OF THE INVENTION (280 characters max)					
GASKET INSTALLATION APPARATUS					
CORRESPONDENCE ADDRESS					
Direct all correspondence to:					
<input type="checkbox"/> Customer Number		<div>Place Customer Number Bar Code Label here</div>			
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Address		Commerce Court West, Suite 4900, Toronto, Ontario, Canada, M5L 1J3			
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Country		Telephone	416-862-3616	Fax	416-862-7661
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Respectfully submitted,

SIGNATURE

DATE February 9, 1999

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GASKET INSTALLATION APPARATUS

Field of the Invention

This invention relates to an apparatus for installing gaskets. In particular, this invention relates to an apparatus for installing an elastomeric gasket into a channel on a component.

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Background of the Invention

In an automobile engine, it is common to use an endless gasket between mating parts such as a valve cover and a cylinder head. An endless channel is provided on one or both of the mating surfaces to receive and retain an endless gasket. The gasket is inserted into the channel before final assembly of the valve cover to the cylinder head.

Installation of gaskets into the endless channel can pose many problems. An operator starts the installation of the gasket by placing the gasket over the channel. Next, the operator starts pressing the gasket into the channel. The operator must ensure that the insertion of the gasket is even. However due to the elastomeric nature of the gasket, the operator commonly "chases" the gasket, as previously inserted portions of the gasket pop out of the channel as the uninstalled portions of the gasket are being inserted. Further, slight stretching of the gasket during installation can result in misalignment of the gasket within the channel.

It is known in the art to provide a flat gasket carrier which releasably receives a gasket for insertion into the endless channel. The endless channel is aligned with the gasket and direct pressure is applied to the gasket carrier to insert the gasket into the channel. However a slight misalignment of the part with the gasket causes any misaligned portions of the gasket to buckle and remain uninserted.

Summary of the Invention

The disadvantages of the prior art may be overcome by providing an apparatus for installing a gasket in an endless channel of a component. The apparatus has a holder for suspending the component without obstructing the endless channel. An arcuate gasket holder has a groove which orients the gasket to present an insertion flange towards the endless channel. The gasket holder is pivotally and slidable mounted such that after a first portion of the gasket is first inserted, the gasket holder is driven so that it rocks relative to the component pushing the gasket into the channel.

Brief Description of the Drawings

Presently preferred embodiments of the invention will now be described, by way of example only, with reference to the attached figures wherein:

- Figure 1 is a perspective view of an engine valve cover;
- 5 Figure 2 is a section view through line II-II in Figure 1;
- Figure 3 is an elevational view of an engine valve cover gasket;
- Figure 4 is a section view through line IV-IV of the gasket shown in Figure 3;
- Figure 5 is a front elevational view of a gasket assembly station;
- Figure 6 is a perspective view of gasket assembly machinery within the station shown in Figure 5;
- 10 Figure 7 is a partial rear perspective view of the gasket assembly station shown in Figure 6;
- Figure 8 is a front elevational view of the gasket assembly station as shown in Figure 6;
- 15 Figure 9 is a front elevational view of the gasket assembly station shown in Figure 6 with the gasket carrier in engagement with the first end of the valve cover of Figure 1;
- Figure 10 is a front elevational view of the gasket assembly station shown in Figure 8 with the gasket carrier in engagement with the centre of the valve cover;
- 20 Figure 11 is a front elevational view of the gasket assembly station shown in Figure 9 with the gasket carrier in engagement with the opposite end of the valve cover; and
- Figure 12 is a section view through line XII-XII in Figure 10.

25 Detailed Description of the Drawings

Referring to Figures 1 and 2, a valve cover for covering a cylinder head of an automobile engine is indicated generally at 20. Valve cover 20 is conventional in the art and is generally concave with a sealing surface 24 extending about the periphery of the valve cover 20. As illustrated in Figure 2, sealing surface 24 has a channel 28 for receiving a gasket.

Referring now to Figures 3 and 4, a gasket 32 for sealing the engagement between valve cover 20 and the cylinder head of the automobile engine is illustrated. Gasket 32 is flexible and preferably formed from silicone or a silicone based composition. It is to be understood that gasket 32 can be formed from other elastomeric materials. As best seen in Figure 4, gasket 32 has a uniform cross section comprising a generally key-hole shape. The key-hole shape has a bulbous portion 34, an insertion flange 36 and a lateral flange 38. Insertion flange 36 is sized to friction fit within channel 28. To assist in the friction fit, lateral flange 38 impinges on the inner surface of channel 28, thus ensuring retention of insertion flange 36 within channel 28. Bulbous portion 34 presents a sealing bead about the periphery of the valve cover 20 for sealing engagement with the cylinder head.

Figure 5 shows a first embodiment of a gasket installation apparatus in accordance with the present invention, indicated generally at 50, for installing gasket 32 into valve cover 20. Apparatus 50 comprises a base 54 on which a structural frame 58 having frame members defining a parallelepiped structure is mounted. A part holder 62 is mounted to frame 58 and suspended over a gasket carrier 66 and a driver or gasket applicator 70.

Part holder 62 will now be described with reference to Figure 6. Part holder 62 comprises a plate 71 and swing clamps 72. Plate 71 is affixed to opposite sides of frame 58. Plate 71 has an opening 76 for receiving valve cover 20. A series of mounts (not shown) are located about the inner periphery of opening 76 to support the outer periphery of cover 20 in a channel-side down condition. The mounts engage cover 20 without interfering with or obstructing channel 28. Clamps 72 are pivotally mounted and swing over the opening 76, so as to impinge cover 20 between the clamps 72 and the mounts thereby securely retaining cover 20 within opening 76. Preferably swing clamps 72 are pneumatically-driven, and are movable between a release position and a locked position as shown by arrow A in Figure 6.

Gasket carrier 66 will now be described with reference to Figures 6-11. Gasket carrier 66 is a curved plate having a groove 78 on the convex surface thereof. Groove 78 has the same general outline as the channel 28 and is complementary to 34 bulbous portion of gasket 32. The groove 78 receives bulbous portion 34 so as to present insertion flange 36 towards channel 28. As best seen in Figure 9, the curvature of carrier 66 provides an angle of α between a line tangent to centre 80 and

a line tangent to first end 82, and an angle of β between a line tangent to centre 80 and a line tangent to second end 84. α and β can be in the range from about 11° to about 22° . Preferably, α and β should be in the range of from about 12° to about 19° . However, the preferred embodiment has α about 14° and β about 14° . It will be understood that other curvatures can be provided which will facilitate the insertion of the gasket, and that α need not be equal to β , and that the exact curvature used will depend on the particular geometry of the part and gasket to be installed.

Gasket applicator 70 will now be described with reference to Figures 6-10. As will now be apparent to those of skill in the art, gasket applicator 70 attaches to gasket carrier 66 and provides a means to insert gasket 32 into groove 78 by rocking gasket carrier 66 along channel 28. As best seen in Figure 6, gasket applicator 70 interfaces with carrier 66 via a platform 88 to which gasket carrier 66 is slidably mounted. A pair of runners 92 mounted to the bottom of carrier 66 slidably grasp a pair of rails 94 affixed to platform 88. Drive cylinder 98 is affixed to platform 88 so as to be disposed between the platform 88 and the carrier 66 and to effect transverse movement thereof as indicated by arrow B. Gasket carrier 66 can be placed in a load position transversely distal from plate 71 (best seen in Figure 6), to a ready position such that gasket carrier 66 aligns with opening 76 (best seen in Figures 9-11). Platform 88 is transversely mounted to a carrier base 90 in such a manner that platform 88, base 90 and carrier 66 can pivot about a transverse axis as indicated by arrow C, and slide longitudinally as indicated by arrow D.

Referring now to Figures 6-11, guides 113 are mounted on opposite ends of a pedestal 129. A drive cylinder 119 mounted to frame 58 moves between a retracted position and an extended position to effect guided movement of the carrier base 90. Pins 118, 120 are integral with and project from carrier base 90 in a vertical direction. Guide slots 114, 116 are generally "J" shaped slots which are canted away from each other. Guide slots 114, 116 receive pins 118, 120 and cooperate with drive cylinder 119 to direct the pivotal movement of gasket carrier 66.

As best seen in Figure 7, the rear face of platform 88 has an arcuate rail 124 similar to rails 94. Arcuate rail 124 has a curvature that is generally coincident with the curvature of gasket carrier 66. A runner 126 similar to runners 92 is affixed to the end of cylinder 119 and slidably grasps arcuate rail 124 for slidable movement therealong. On the underside of carrier base 90 is a second rail 128, also similar to rails 94, mounted to pedestal 129. A second runner 130, also similar to

runners 92, is also affixed to the end of cylinder 119 underneath runner 126. Second runner 130 slidably grasps rail 128 for slidable movement therealong.

Referring now to Figures 8-11, pedestal 129 is slidably mounted on frame 58 by runners 102 which slidably grasp rails 106. Lift cylinder 110 is mounted to base 54 and is operatively connected to pedestal 129, thereby effecting movement of pedestal 129 between a lowered position and a gasket application position. The lowered position is best seen in Figure 8, while Figures 8-10 show the gasket application position. As best seen in Figure 9, in the retracted position cylinder 119 urges base 90 longitudinally such that pin 118 is in the curved end of guide slot 114, and pin 120 is in the straight end of guide slot 116. Accordingly, platform 88 is canted such that first end 82 of gasket carrier 66 engages valve cover 20.

As shown in Figure 10, as cylinder 119 extends pins 118, 120 will be guided by guide slots 114, 116 and will move platform 88 and gasket carrier 66 in an arcuate motion. Accordingly gasket carrier 66 will "rock" along a point of contact between gasket carrier 66 and valve cover 20. In other words, a single point of tangential contact will translate along.

As shown in Figure 11, in the extended position cylinder 119 urges the platform such that pins 118, 120 will move to the opposite ends of guide slots 114, 116. Accordingly, platform 88 is canted such that second end 84 of gasket carrier 66 engages valve cover 20.

The operation of the present embodiment will now be explained with reference to the foregoing and Figures 1-12. Gasket carrier 66 is in the load position as illustrated in Figure 6, laterally distal from part holder 62. An operator places valve cover 20 into opening 76, such that the periphery of cover 20 rests on the mounts. The operator places gasket 32 into groove 78 such that bulbous portion 74 is releasably received within groove 78, and insertion flange 36 is presented upwardly.

The operator then moves outside of frame 58 and actuates the start of a sequence of automatic operations in apparatus 50 through any suitable actuation means such as a pair of push buttons connected in a series which provide a signal to a controller unit such as programmable logic controller (PLC). It will be understood that other actuation means and controller units can be provided, and that such variations do not depart from the scope of the present invention.

The controller unit then executes the following sequence of events to install gasket 32 into

the channel 28 of cover 20. First, swing clamps 72 are actuated to move to the lock position to secure cover 20 within part holder 62. Next, cylinder 98 is extended to move carrier 66 from the load position into the ready position so as to align the gasket 32 with channel 28 of cover 20. Next, lift cylinder 110 is extended from the lowered position to the gasket application position, thus moving pedestal 129 and carrier base 90 upwardly to insert of the insertion flange 36 at the first end 82 of carrier 66 into the corresponding portion of channel 28. As best seen in Figures 10-11, cylinder 119 then moves from the retracted position to the extended position and platform 88 responsively moves in a guide manner to produce a rocking motion. As the platform 88 moves in the rocking motion, the carrier 66 will contact the valve cover 20 along a transverse line which will move longitudinally, thereby rocking the curved surface of carrier 136 along channel 28 and pushing the remainder of the gasket 32 into the corresponding portions of channel 28. The insertion of gasket 20 is best seen in Fig. 12.

Having completed the installation, lift cylinder 110 is retracted into the lowered position to move carrier 66 away from the valve cover 20. Cylinder 119 is then moved into an intermediate position, wherein the carrier 66 is generally level. Cylinder 98 then moves carrier 66 from the ready position into the load position. Clamps 72 move to the release position, thereby allowing the removal of cover 20 with gasket 32 installed.

While the foregoing illustrates an operative sequence of operation, it will be apparent to persons skilled in the art that the exact sequence can vary, and that such variations do not depart from the scope of the present invention. For example, the gasket applicator can be a simple hand-held interface to manually rock the gasket carrier along the cover. Alternately, the gasket carrier can be stationary while the cover is rocked along the surface of gasket carrier.

It is apparent to those skilled in the art that the apparatus of the present invention may be ganged together in a back-to-back fashion. A back-to-back arrangement would facilitate the gasket installation process for installing gaskets for right and left-hand valve covers for a V-8 engine.

It will be apparent from the discussion above that the present invention provides a novel gasket installation apparatus by providing a gasket carrier having a curved surface which releasably receives and orients a gasket, and presenting an insertion flange for insertion into a channel of a part. The carrier can then be rocked relative to and along the channel to sequentially urge the gasket into

the channel. The use of a gasket carrier having a curved surface ensures that portions of the gasket are properly inserted into the channel. The insertion can be accomplished in a very short period of time, thereby increasing productivity while ensuring proper insertion of the gasket. Additionally, the present invention could also be used with other shapes of gaskets, including non-endless gaskets.

- 5 It will now be apparent to persons skilled in the art that the present invention can be directed to apply gaskets to parts other than valve covers and cylinder heads, and that the present invention can be used for insertion of elastomeric gaskets into channels in a wide variety of parts including pumps, timing covers and other components, automotive and non-automotive alike.

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We claim:

1. An apparatus for applying an elastomeric gasket to a part, said gasket having a bulbous portion and an insertion flange, said part having a channel to receive and retain said flange, said apparatus comprising:
 - 5 a part holder for securing said part and presenting said channel in an unobstructed manner;
 - a gasket carrier having a curved surface releasably receiving and orienting said gasket, said gasket carrier slidably mounted for guided rocking movement along said curved surface between a start position and a finish position; and
 - a driver engaging said gasket carrier effecting said guided rocking movement, whereby as
- 10 said gasket carrier rocks from the start position to the finish position, the gasket carrier urges an initial portion of the gasket into the channel and then progressively urges a remainder of the gasket into the channel.
2. An apparatus for applying an elastomeric gasket to a part, said gasket having a bulbous portion and a flange, said part having a channel to receive and retain said flange, said apparatus
- 15 comprising:
 - a gasket carrier having a curved surface on which said bulbous portion of said gasket is releasably received for presenting said flange on a first portion of said gasket for engagement with a corresponding portion of said channel and for rolling said part along said surface to insert said flange of the remainder of said gasket into corresponding portions of said channel.
- 20 3. A dual gasket assembly apparatus comprising a first station and second station, said first station comprising a first apparatus in accordance with the apparatus of claim 1, said second station comprising a second apparatus in accordance with the apparatus of claim 1.
4. The apparatus according to claims 1, 2 or 3 wherein said surface has a first angle from about 11° to about 22° between a first line tangential to a centre of said carrier and a second line
- 25 tangential to a first end of said carrier, and a second angle from about 11° to about 22° between said first line and a third line tangential to a second end opposite said first end of said carrier.
5. The apparatus according to claims 1, 2 or 3 wherein said surface has a first angle from about 12° to about 19° between a first line tangential to a centre of said carrier and a second line tangential to a first end of said carrier, and a second angle from about 12° to about 19° between said

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first line and a third line tangential to a second end opposite said first end of said carrier.

6. The apparatus according to claims 1, 2 or 3 wherein said surface has a first angle of about 14° between a first line tangential to a centre of said carrier and a second line tangential to a first end of said carrier, and a second angle of about 14° between said first line and a third line tangential to a second end opposite said first end of said carrier.

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ABSTRACT

An apparatus for inserting a gasket into a channel of a mating part has a part holder for securing the part without obstructing the channel. A curved surface orients the gasket and presents an insertion flange towards the channel. An arcuate gasket holder has a channel which orients the
5 gasket to present an insertion flange of the gasket towards the endless channel. The gasket holder is pivotally and slidable mounted such that after a first portion of the gasket is first inserted, the gasket holder is driven so that it rocks relative to the component pushing the gasket into the channel.

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FIG. 1

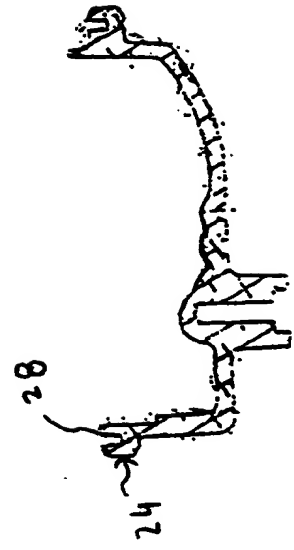
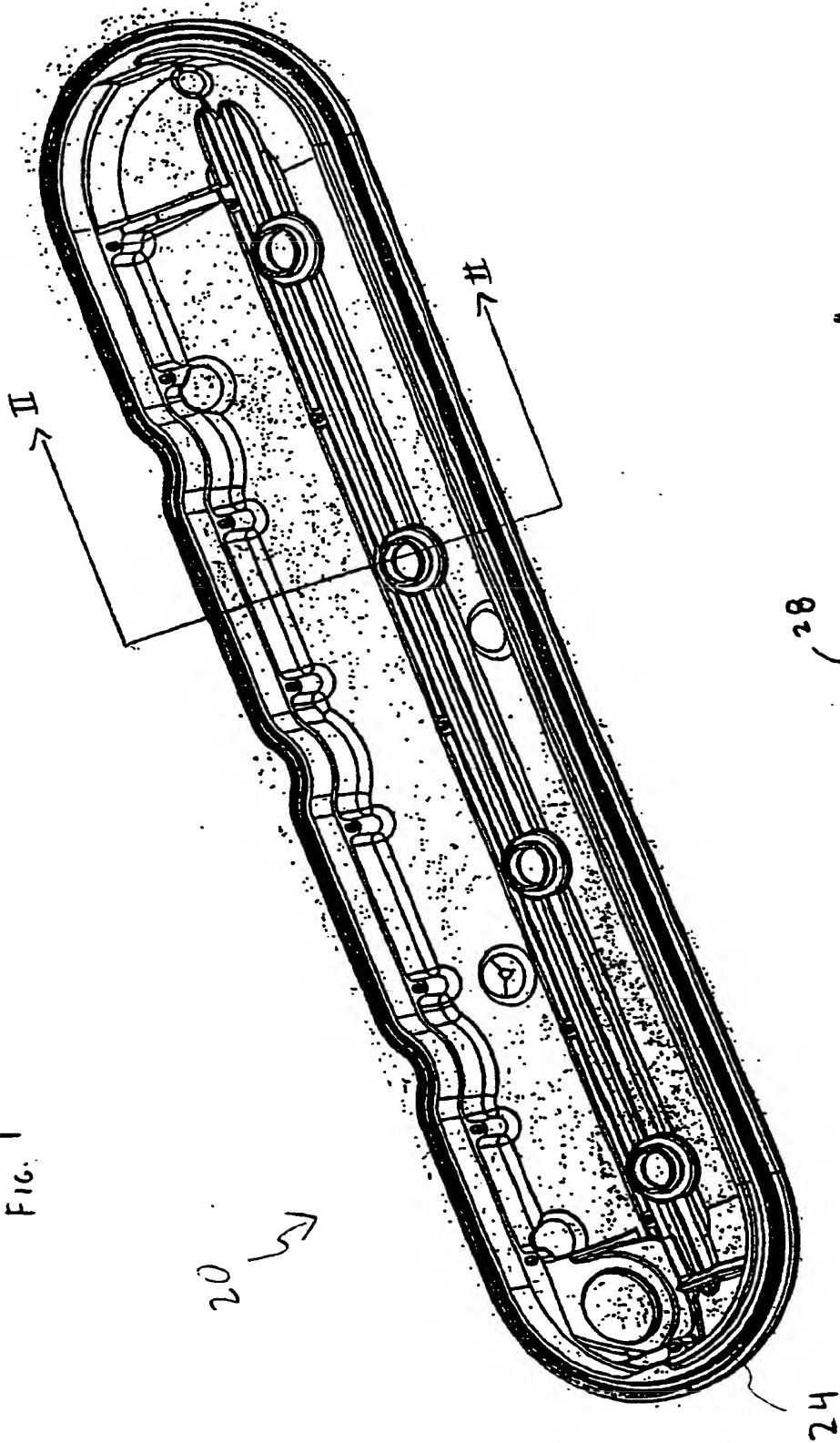
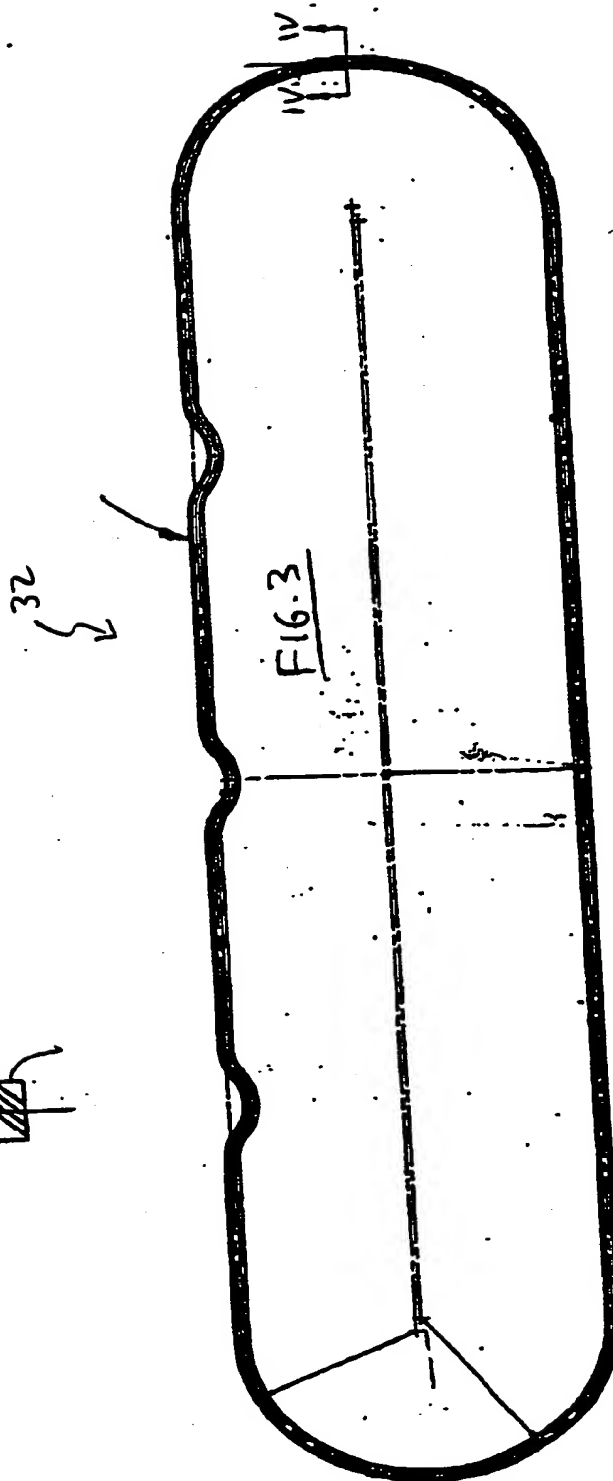
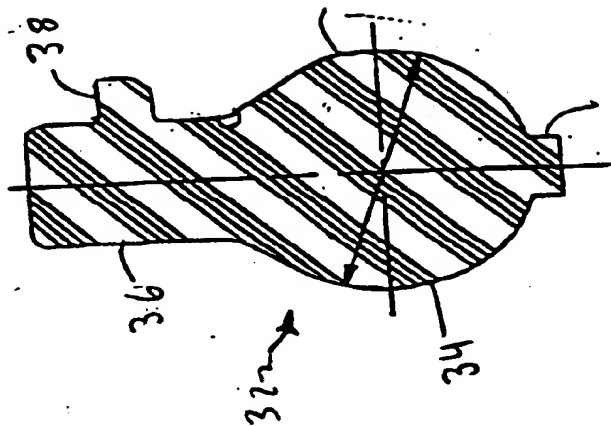


FIG. 2

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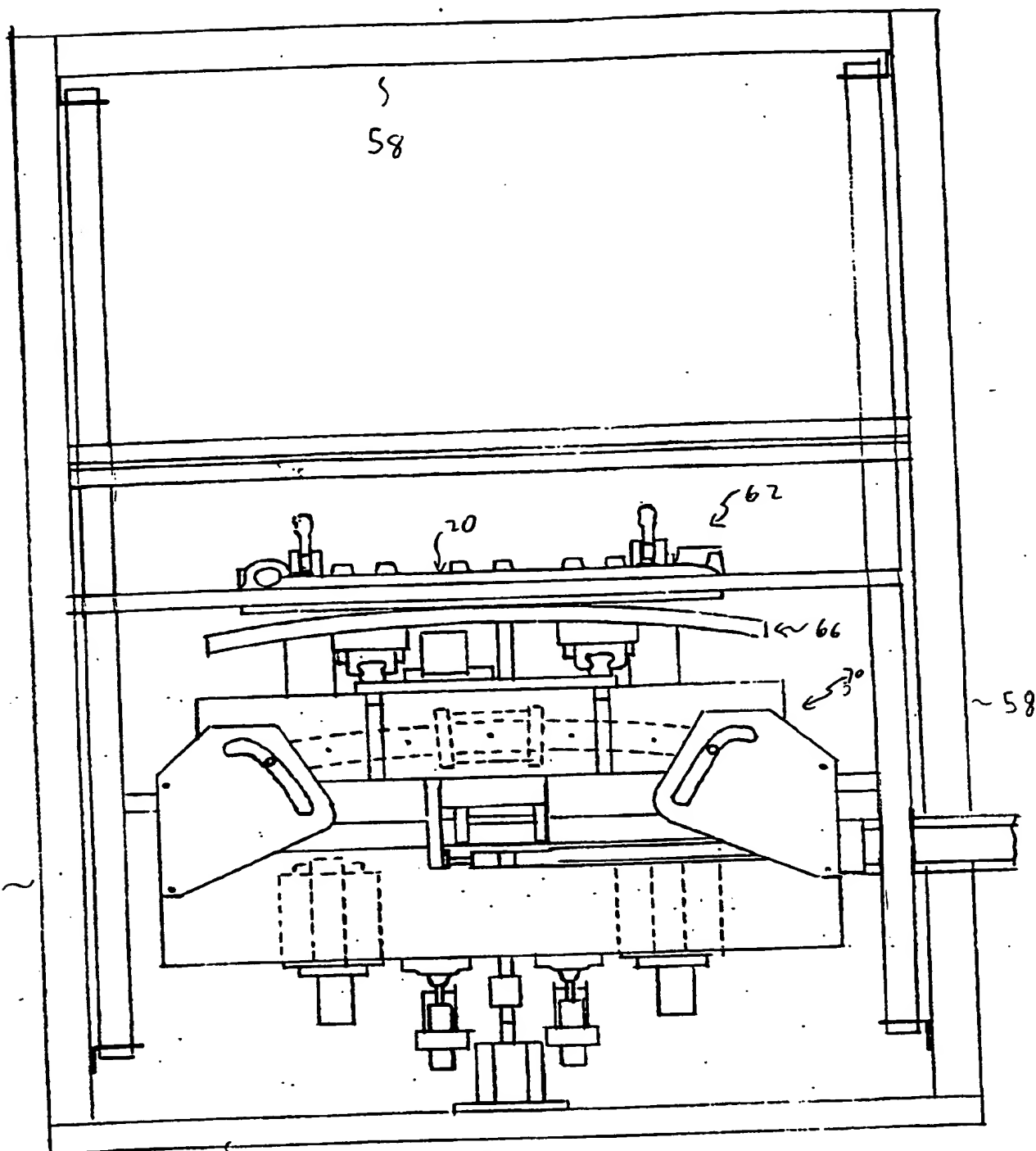


FIG. 5

~ 50

FIG. 6



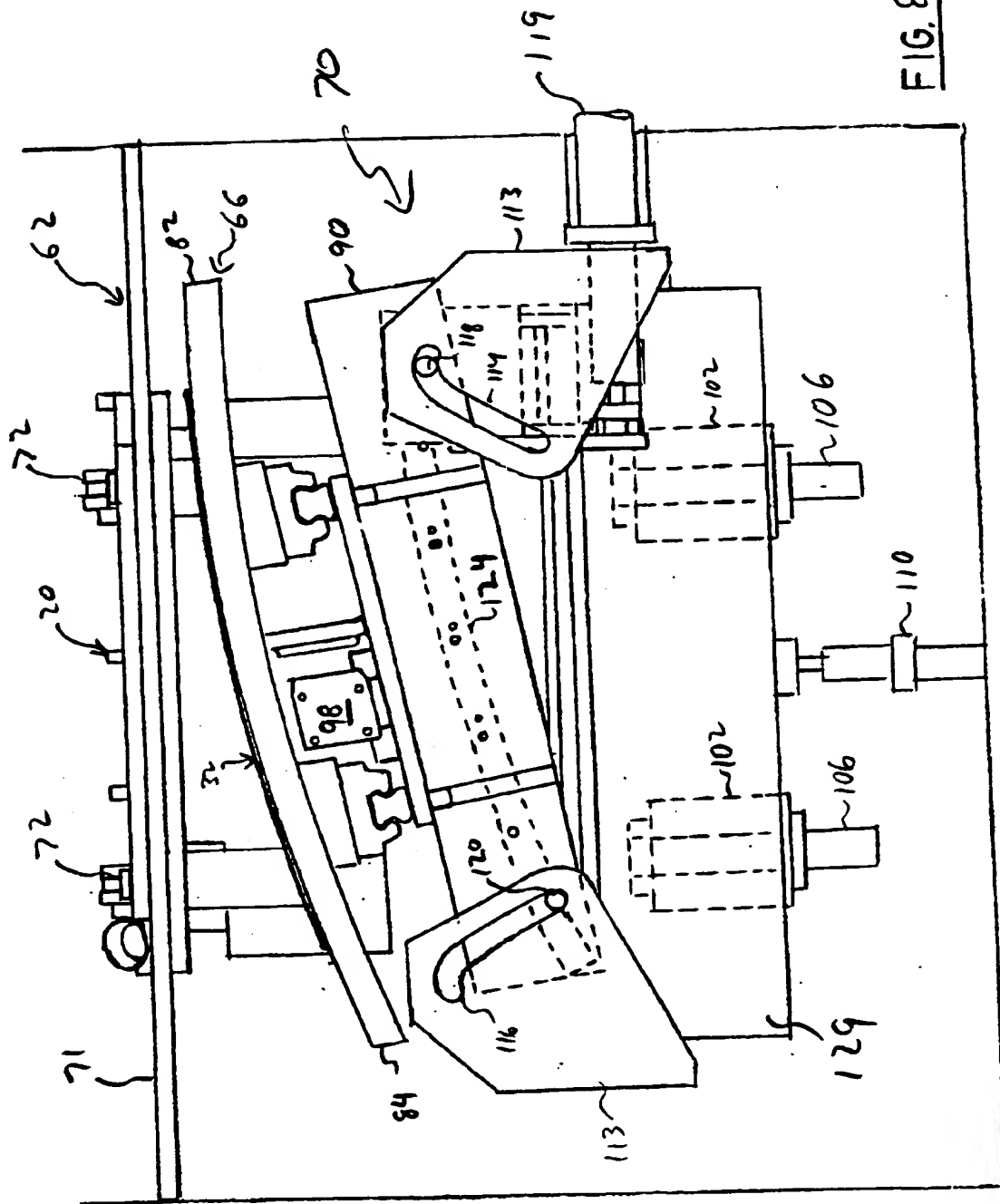
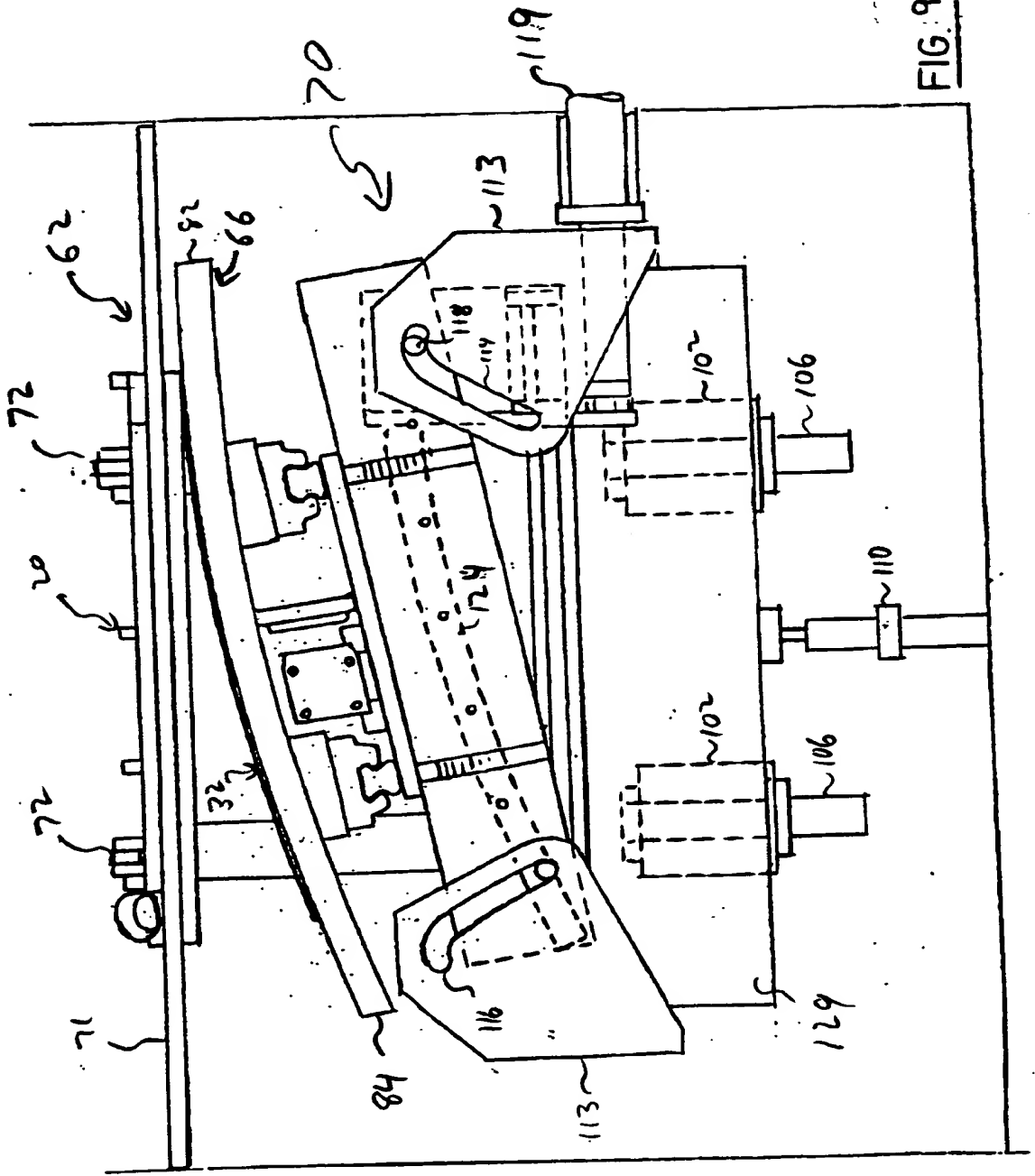


FIG. 8



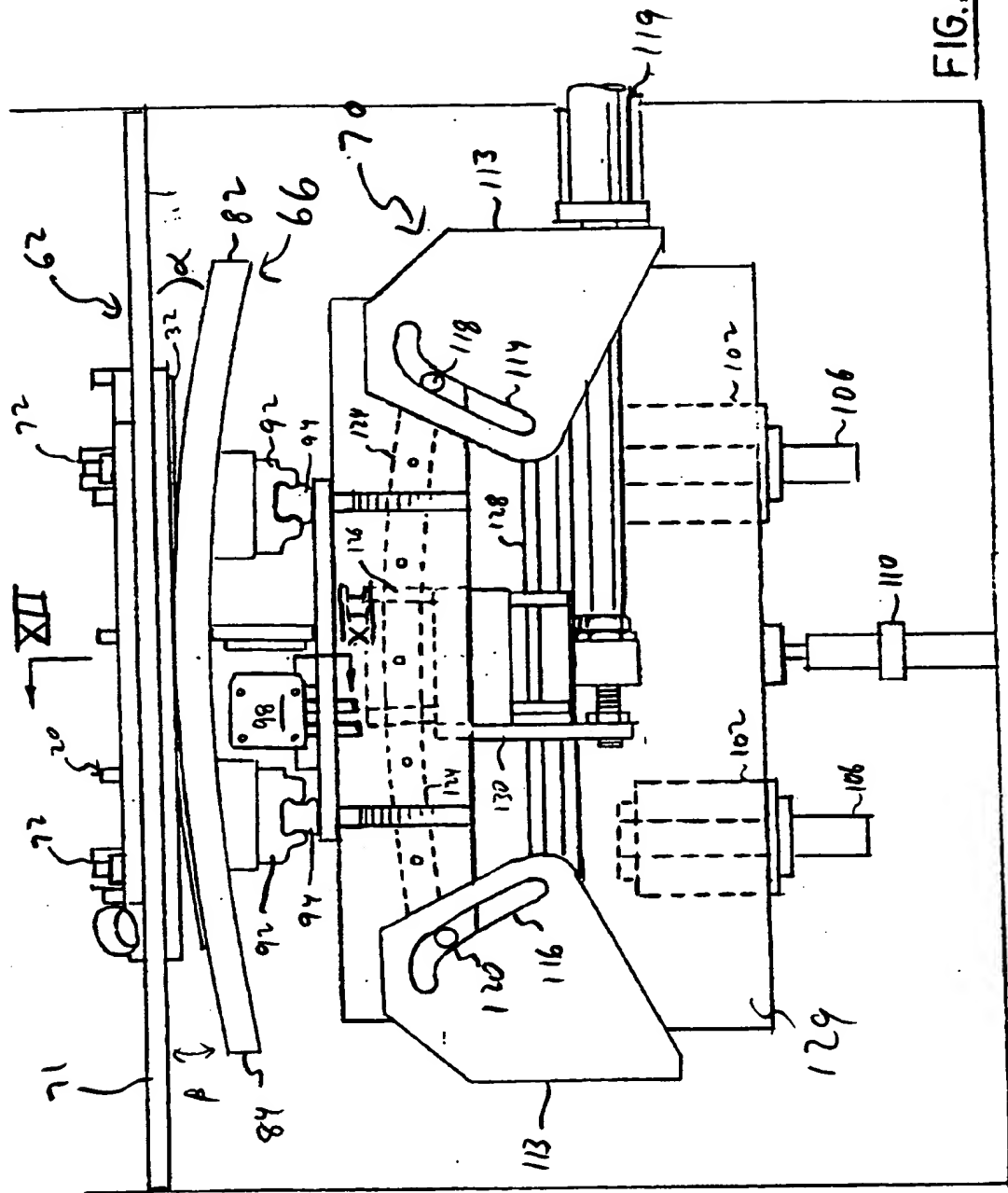
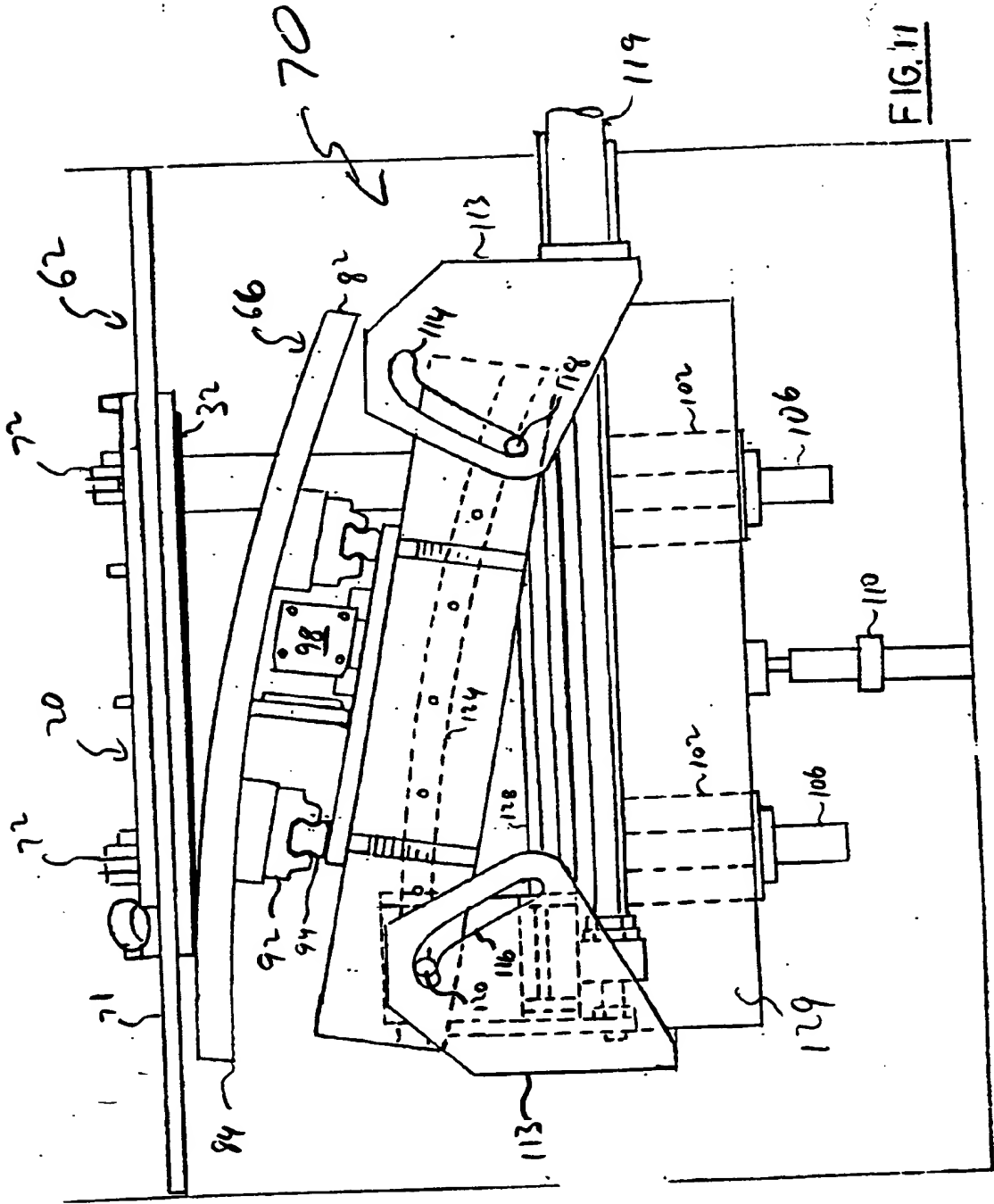


FIG. 10

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72

76 70

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FIG. 12

